COURSE TITLE: Foundations of Energy

UNIT TITLE: Renewable Energy – Geothermal

SECTION 1: General Information and Overview

Grade Level: 9-12

Suggested Number of Lessons: 4-6

Suggested Time to Complete Unit: 5-10 class periods

Unit Overview: This unit focuses on the role of Geothermal Energy in production of electricity, its impact on the state's and nation's energy portfolios including geothermal residential and commercial applications.

SECTION 2: Essential Questions

1.	What role does geothermal energy have in the nation's energy portfolio?
2.	What role does geothermal technology have in residential and commercial construction?
3.	Where is geothermal energy/technology most abundant and why?

SECTION 3: Major Focus

Technical Content CTE Program of Studies	Learner Activities (Enabling Knowledge and Skills/Processes)	Core Content For Assessment	Academic Expectations
Construction Technology KOSSA Standard AD-002: Demonstrate the ability to learn new processes and steps. **2.1**--Assess the impact of various current and new technologies on the economy.	Using the PDF files in the Geothermal unit, **read** the back grounder in the S*econdary Energy Info Book.* **Watch** a teacher demonstration on the production of geothermal energy (using a tea pot to boil water). **Record** the steps and **discuss** the how, what and why this is relative to energy production.	**SC-HS-4.6.8** Students will: • describe the connections between the functioning of the Earth system and its sources of energy (internal and external). • Predict the consequences of changes to any component of the Earth system. Earth systems have	**2.1** Students understand scientific ways of thinking and working and use those methods to solve real-life problems.

2.1-2.2--Identify new and emerging technology.	Using research from the folder, *Energy on Public Lands* and other varied resources of student's choice (e.g.; YouTube, Google, Nat-Geo) **record** findings in notebook and **mak**e compilation of notes which will be used for presentation (power point, exhibit board or an oral presentation) to class. **Include** information on current and new technologies in geothermal power for understandings of current energy trends and the impact on our nation's energy portfolio and economy.	sources of energy that are internal and external to the Earth. The Sun is the major external source of energy. Two primary sources of internal energy are the decay of radioactive isotopes and the gravitational energy from Earth's original formation. **DOK 3**	
Construction Technology KOSSA Standard EA-005: Display initiative. **5.4--**Investigate the role of geothermal technology in the future.	Using the NEED website, www.need.org, **investigate** the careers related to the geothermal industry. Include training requirements and special skills needed to work in the industry. **Prepare** a resume' for an individual seeking a job in the geothermal industry.	Students will: • describe the connections between the functioning of the Earth system and its sources of energy (internal and external). • predict the consequences of changes to any component of the Earth system. Earth systems have sources of energy that are internal and external to the Earth. The Sun is the major external source of energy. Two primary sources of internal energy are the decay of	**2.3** Students identify and analyze systems and the ways their components work together or affect each other.

		radioactive isotopes and the gravitational energy from Earth's original formation. **DOK 3**	
Construction Technology KOSSA Standard AC-002: Students will identify methods of planning that will save costs on time and materials.	**Participate** in the development of a Geothermal Expo.		**2.4** Students use the concept of scale and scientific models to explain the organization and functioning of living and nonliving things and predict other characteristics that might be observed.
Construction Technology KOSSA Standard EA-009: Students will show an understanding of established guidelines for safety in the industry.	**Research** standards and guidelines for working in the Geothermal industry. **Summarize** findings and **record** in class notebook.		**2.5** Students understand that under certain conditions nature tends to remain the same or move toward a balance.

SECTION 4: Culminating Project with Scoring Guide

Students work in teams of three to develop a Geothermal Energy Expo and presentation. Presentations will be on display for the public at area locations.

SCORING GUIDE:

CATEGORY	4	3	2	1
CONTENT	EXTENSIVE- CONTENT BEYOND WHAT IS TAUGHT IN CLASS	GOOD- EXPLANANTION OF CONCEPTS COVERED IN CLASS	BASIC – WHAT HAS ALREADY BEEN COVERED IN CLASS	LIMITED- DOESN'T COVER MATERIAL AS WELL AS DONE IN CLASS
TECHNOLOGY	EXTENSIVE- POWER POINT WITH EXCELLENT ANIMATION AND PICTURES	APPROPRIATE- POWER POINT HAS SOME ANIMATION AND PICTURES	BASIC- POWER POINT WITH LITTLE ANIMATION AND PICTURES	LIMITED – POWER POINT WITH NO ANIMATION OR PICTURES
PRESENTATION	EXCELLENT- FLOWS WELL, AUDIENCE VERY ATTENTIVE- WELL REHEARSED	GOOD – FLOWS WELL PARTICIPANTS KNOW MATERIAL WELL	BASIC – FLOWS UNEVENLY MAY HAVE SOME READING OF NOTES OR SLIDES	LIMITED- PARTICIPANTS READ FROM NOTES OR SLIDES
INTEREST	EXTENSIVE – PARTICIPANTS MAKE MANY EXTENSIONS AND EXPLANATIONS	APPROPRIATE – ENCOURAGES QUESTIONS AND COMMENTS	BASIC – CAN FIELD SOME QUESTIONS	LIMITED – GLAD TO BE THROUGH WITH THE PRESENTATION

SECTION 5: Assessment and Enabling Skills and Processes

Assessment:	Students work in teams of three developing a Geothermal Energy Expo and presentation. Presentations will be on display for the public at area locations. Daily work and class notebook.

SECTION 6: Support Materials (i.e., Resources, Technology, and Equipment)

A. Resources	NEED materials, Internet resources
B. Technology	Personal tools
C. Websites (samples of many available)	www.need.org; www.eia.gov, www.doe.gov; Google
D. Equipment	Glue guns and supplies